

## LIGHTING THE FARM HOME

### PART I -- INTRODUCTION

The importance of good lighting to our health, comfort and convenience can hardly be over-emphasized. To assist farm families who are getting electricity for the first time, to plan for adequate lighting presents a challenging opportunity. The foundation for good lighting begins with the wiring plans and follows through to the selection and location of fixtures and lamps in the home. A carefully planned wiring system with an adequate number of switches and convenience outlets properly located is essential to safe, convenient and efficient use of lighting equipment in the home.

Let's first consider briefly the relation of light to sight and the need for good lighting. This need is evidenced by the fact that nearly half of our population suffers from some eye defects. Certainly poor lighting in the home, school and factory is a large contributing factor. Only a small percent of children entering school have eye defects for which glasses are prescribed, but by the time they are graduated from high school, one out of every four has some measurable eye defects. 23% have defective vision at the age of 20. At the age of 30 the figure increases to 39%, at 40 it is up to 48% and at 60, it reaches 71%. (See Chart A)

Inadequate light is perhaps the largest single cause of eyestrain, yet it is the easiest to control. It isn't the artificial light itself that is bad for our eyes, but rather the lack of it, or its poor quality. Through scientific study, it has been shown that eyestrain caused by inadequate lighting can be relieved when enough light of good quality is provided.

### PART II -- ESSENTIALS OF HOME LIGHTING

The first requisite of good lighting is enough light throughout the house to provide the amounts required for the various tasks and activities. The second is light of good quality to insure comfort, safety and satisfaction for every member of the household.

#### Quantity of Light - How Much is Needed

We no longer need to guess about the amount of light needed for varied seeing tasks for now with the use of the light meter it can readily be determined as to whether there is sufficient light or not. This meter registers the light in footcandles\* just as simply as a scale measures weight in pounds. The amount of light registered on the scale face varies, of course, with the intensity of the light (source), its distance from the meter and the proper use of the meter.

\* One footcandle is the amount of light produced on a perpendicular surface one foot distant from a lighted standard candle.



Table I gives the minimum amounts of light needed for common household activities.

Table I--Illumination Values for the Home\*

Specific Visual Tasks	Footcandles Recommended
Reading	
Prolonged periods (smaller type)	40
Casual periods (larger type)	20
Sewing	
On dark goods, fine needlework	100 or more
Average sewing (prolonged)	40
Average sewing (periodic)	20
Writing	20
Children's study table	40
Game Tables	
Card table	10
Ping-Pong	40
Kitchen	
Work counter, range and sink	40
Dressing Table Mirror	20
Bathroom Mirror	40
Laundry	
Ironer, ironing board or tubs	40
Workbench	40
General Lighting	
Entrance hall, stairways and stair landings	5
Living room, library, sunroom	5
Dining room	5
Kitchen	10
Bedroom	5
Bathroom	5

\*Recommended Practice of Home Lighting - Illuminating Engineering Society, June, 1945



Other factors that must be considered in determining the quantity of light are:

1. Selection and location of fixtures.
2. Type and wattage of bulbs.
3. Reflection of light from room finishes.

Note: Points 1 and 2 will be discussed under Part III.

#### Reflection of Light

The quantity of light available for seeing in a room is greatly dependent upon the reflective qualities of the walls and ceiling. Dark colors absorb light, while light colors reflect light. As will be seen in Table II, different colors reflect different amounts of light.

Table II--Reflection Factors of Paint, Paper and Wood  
Finishes for Interiors \*

Color	Per Cent of Light Reflected
White	85
Light	
Cream	75
Gray	75
Yellow	75
Buff	70
Green	65
Blue	55
Medium	
Yellow	65
Buff	63
Gray	55
Green	52
Blue	35
Dark	
Gray	30
Red	13
Brown	10
Blue	8
Green	7
Wood Finish	
Maple	42
Satinwood	34
English Oak	17
Walnut	16
Mahogany	12

\* Above Table from Recommended Practice of Home Lighting - Illuminating Engineering Society, June 1945



The type and texture of paint used in ceiling and wall finishes is also important. A mat finish, generally speaking, is better than a gloss finish, in that it spreads or diffuses the light in all directions while a glossy surface tends to mirror the light, thus producing annoying glare.

### Light of Good Quality

The main requirements for light of the proper quality are:

1. Free of glare - direct and reflected.
2. Well diffused - no harsh shadows.
3. Well distributed - no sharp contrasts.

Glare - There are two types of glare: direct and reflected.

Direct glare comes from bare bulbs or from lamps and fixtures with shades too transparent to diffuse the light.

Reflected glare is caused by light falling on shiny work surfaces, highly polished furniture and the like, from which it is reflected into the eyes. Both types are harmful to the eyes, causing eyestrain and greatly reducing one's efficiency. Glaring lights are also hazardous. Many accidents occur because visibility is greatly reduced by a glaring light. The presence of glare is a most obvious sign that lighting needs to be improved.

Well Diffused Light - Sharp or harsh shadows, which are one cause of eyestrain, are largely caused by bare bulbs and poorly shaded lamps and fixtures. This may be corrected by use of translucent or prismatic diffusing materials to shade the bulbs. For example: with the use of a glass or plastic reflector (also called diffusing bowl) under the shade of a portable lamp, the light is broken up and diffused through the whole area of the bowl. This softens shadows and the light produced is easy on the eyes. Light may be further diffused by reflecting it against walls and ceilings with dull finishes.

Well Distributed Light - There should be no sharp contrasts in the level of light in the room. If light is directed only on the visual task and the surrounding areas are left in darkness, the eyes must constantly adjust themselves to the dark areas every time one glances around the room. This is very tiring on the eyes and results in eyestrain. To obtain light with a minimum of shadows, it is recommended that a ceiling fixture be used to provide general illumination throughout the room and to use lamps to provide local light needed where reading or other close seeing work is done. A good rule to follow is to have at least one tenth as much general illumination in the room as is needed on the specific task.

### Types of Fixtures

Fixtures are classified by the manner in which light from them is distributed. In principle, they fall into four main types:

1. Direct - Light is directed mainly downward. The bare bulb is shielded somewhat from view but the shadows and glare make it undesirable for use in the home, except possibly in the basement and over work benches.
2. Semi-Direct - Light is diffused evenly in all directions.



The enclosing oval glass globes commonly used for kitchens, baths and porches are good examples of this type.

3. Indirect - All light directed to the ceiling where it is redistributed or reflected throughout the room. There is a minimum of shadows and glare from this type of fixture but there is less light or footcandles per watt than from other types.

4. Semi-Indirect - This type combines features of the semi-direct and indirect. The light is largely directed to the ceiling for reflection, some being diffused through the bottom of the bowl.

### PART III -- SELECTION OF FIXTURES

Ceiling fixtures are generally recommended to (1) provide general illumination in the room and (2) to provide for flexibility in the range of light needed to meet requirements for different activities.

The trend in the design of fixtures is towards a more functional type with simple lines and free of elaborate decoration. A well designed fixture should combine a pleasing appearance with adequate illumination. In design and color it should be in harmony with the furnishings of the room and the house as a whole. A fixture should be selected for good illumination first and decoration last. Those approved by American Home Lighting Institute bear the AHLI tag.

The scale of fixtures in relation to room sizes is also important. A general rule to follow in this is that the diameter of the fixture should be as wide in inches as the width of the room is in feet. Example: A living room 14 x 16 feet would need a fixture approximately 14 inches in diameter.

#### Living Room

For general lighting a ceiling fixture is recommended. An inverted bowl-type is more efficient and easier to clean than a cluster-type fixture. It should be light in color with opal or ivory glass ware. The fixture generally should be hung so that it is about  $7\frac{1}{2}$  feet above the floor. A ceiling over 9 feet high should have a suspended type of fixture.

For local lighting, use portable lamps to provide adequate light in enough places to permit the family to read, write, study or sew comfortably. Wall brackets, well shaded, may be used to provide additional general illumination and add a decorative note to the room. The additional cost for wiring and bracket fixtures should be evaluated in terms of other lighting needs before expending money for this type of lighting.

#### Dining Room

If the dining room is used only as a dining area, choose a fixture that gives a soft, well diffused light. The inverted bowl type is preferred. If the dining room table is used as a utility table for study, games and sewing, thought should be given to a more flexible type of lighting. Choose a type fixture where a glass or plastic reflector diffuses the downward light (similar to a pin-up lamp) with a broad, deep shade to provide a wide circle of light. This type uses a three-light bulb which provides three intensities of light - 100-200-300 watts. Hang about 30 inches above top of the table.



Wall brackets lend a pleasing note of decoration to the dining room as does the use of fluorescent tubes to light china cabinets and window valances, but additional cost should be considered before investment for this type of light is made. Brackets should be used only in pairs. They should be well shaded and mounted about  $5\frac{1}{2}$  feet above the floor.

### Kitchen

For general lighting, use either a fluorescent or incandescent type of ceiling fixture.

For fluorescent, choose a fixture with two to four 20 watt bulbs for the small or medium sized room. Fixtures using 30 and 40 watt tubes are suitable in the medium or larger kitchen. For low ceilings, plastic, milky glass or stippled glass plates or louvers should be used to shield tubes from the eyes. The fluorescent tubes which are suitable for use in the kitchen and also in the laundry include the following: Daylight ( $6500^{\circ}$  Kelvin - blue in color),  $4500^{\circ}$  K. white (bluish white), and  $3500^{\circ}$  K. white. The latter are usually called 4500 white or 3500 white.

For incandescent, an opal or milky white glass inclosing bowl gives a well diffused light - one of 12-inch diameter with 150-watt bulb is generally recommended.

Local lighting is needed at the sink, range and work counters to prevent working in shadows. The same type as the ceiling fixture (either incandescent or fluorescent), in a small size, is often used over the sink. A fluorescent or incandescent bracket fixture may also be used over the sink where it is located against an unbroken wall space. This same type fixture may also be used over range and work counters. They should be located about 56 to 58 inches above the floor. Where wall cabinets are mounted above work counters, 20-watt fluorescent tubes can be used to an advantage by mounting them on the wall under the cabinet.

### Laundry or Work Room

In planning the lighting for the laundry or work room, it is important to have the light directed on the wash tubs, ironing board and work tables. Two ceiling fixtures are usually necessary to properly light these areas. Fixtures similar to those recommended for the kitchen may be used. The use of daylight bulbs is desirable in that they give a light more nearly like daylight, thus making it easier to detect spots and stains. If the work room is used for sewing, a pin-up lamp will provide the needed local light. Be sure it has a diffusing bowl.

### Bed Rooms and Closets

For general lighting, a simple ceiling fixture is needed. The inverted bowl-type fixture of plastic or glass provides a good light at reasonable cost. White opal, ivory or cream color is preferable. These fixtures are generally available in 12 and 14 inch diameters and use 100 and 150 watt bulbs respectively.



Don't overlook a light in the closet unless it is very shallow and small. A bare 60 watt bulb will do. Locate it in the ceiling or just above the closet door and control it by a pull chain or wall or door switch.

Local lighting should be provided where it is most needed. For that all-important light at the dressing table, use either a pair of dressing table lamps, which should be tall enough (preferably 20 inches for a seated position; 28 inches for standing) to bring the light up even with the face, or two pin-up lamps. In either case be sure shades are white or very light and translucent to permit light to shine through on the face. (Diffusing bowls are never used on these lamps. However, a diffusing plate below the bulb is sometimes used to prevent the reflection of glare from mirrored or shiny dressing table tops.)

Light for reading in bed can best be provided through the use of pin-up lamps, either of the incandescent or fluorescent type. The latter is becoming popular because with the use of the long tubes, the full width of the bed can be illuminated with only one lamp.

#### Bathroom

Local Lighting: The most important lighting in the bathroom is that used at the mirror. Fluorescent fixtures on either side of the mirror are an efficient means of providing adequate light. For the fluorescent fixtures, use 20, 30 or 40-watt daylight or white bulbs. Wall brackets with opal glass shades, preferably of the upturned type, and enclosing 40 or 60 watt incandescent bulbs, provide another good means of lighting the mirror. Use one on each side of the mirror and place these fixtures about 5½ feet above the floor.

General Lighting: In a small room (less than 60 square feet) the mirror lighting can provide the main light in the room. However, most bathrooms also require a ceiling fixture for general lighting. The opal glass-enclosed bowl is a popular type. Be sure to include a wall switch near the door to control the main lighting.

#### Porches, Halls and Stairways

Having entrances well lighted is a proved safety measure. It's important to remember, at all entrances, to have every step leading to the porch or directly to the door completely lighted and free from shadows, and to place the overhead light in such a way that it will not shine in the eyes of the person going up the steps. For the porch, a globe-type ceiling fixture may be installed halfway between the doorway and the steps. Glass enclosed globes or lantern-type fixtures may be used on both sides of the door if there is no porch.

The porch light should be controlled by a switch inside the house and perhaps by one in the garage.



The best way to safety in lighting of halls and stairways is to have plenty of light, free from glare and shadows. There should be no bare bulbs in the line of vision of persons going up or down the stairs. Install a ceiling light on each floor to illuminate top and bottom of stairs, with switches installed so that the lights can be turned on and off both upstairs and down.

The ceiling fixture that lights the stairs should usually be centered in the main part of the hall, near where the stairs begin. If the hall is long, additional lighting will be needed.

If there is a basement, a switch should be installed at the top of the stairs leading to it, so that your descent will be well lighted.

#### PART IV -- SELECTION OF PORTABLE LAMPS

Table, floor and wall lamps provide the most practical and convenient means of getting adequate light where it is needed. Good lighting is so important to the comfort and well-being of the family that special attention should be given to the selection of lamps.

Every place where reading, sewing and other close-seeing jobs are done should have a good lamp with the proper size bulb. By armchairs, at study tables, by the piano and sewing machine, at each end of the davenport are places that need plenty of light. The requirements of good reading lamps are:

1. The base of the lamp should be tall enough to permit a good spread of useful light.
2. It should have a diffusing bowl under the shade to reduce glare and soften the light. These bowls should be of good quality plastic or white diffusing glass of even thickness throughout. The design of diffusing bowls and supplementary equipment should be such that it will shield the eyes from the glare of the bulb when passing by a lamp, and also prevent undue spottiness of light above the lamp on nearby walls.
3. Floor and study lamps designed to use the 3-light bulbs which allow for wider selection of lighting needed for various activities are preferable to single filament bulb. Incandescent and fluorescent bulbs are being combined in some models of lamps.
4. Shades should be broad at the bottom, deep enough to conceal the diffusing bowl and with a white lining to reflect the light. A white-lined shade will reflect about 50% more light than a dark one which absorbs light.
5. Select shades that harmonize one with the other, where two or more lamps are used in the same room.



• The CLM (Certified Lamp Makers) program replaces the I.E.S. certification program. A portable lamp designed to meet the specifications in lighting performance and visual comfort for a designated lighting service will bear the CLM approval markings showing it is a certified lamp.

Since light falls off very rapidly, it is important that lamps be placed close to the visual task - within 14 to 24 inches for close seeing. jobs. Which side the light comes from is important only when doing hand work. Place the lamp to the left for the right-handed person and to the right for the left-handed person, so that the hand will not cast its shadow over the work.

The swivel-armed type of floor lamp can be used to great advantage at broad armed chairs, sewing tables or at a large desk.

Hang the wall type or pin-up lamps so that the bottom of the shade is not more than 25 inches above the work being done, and slightly to the left when used over a slant-top desk or work table.

## PART V -- BULBS - TYPES, USES

### Incandescent Bulbs

While light bulbs may all look alike there is a great difference in quality. It is advisable to buy from reputable manufacturers who conform to the Federal specifications for incandescent bulbs.

Efficiency - From the standpoint of initial cost and operation, one bulb of high wattage will give more light at less cost than several small ones whose combined wattage is the same. Example: It takes six 25-watt bulbs to furnish as much light as one 100-watt bulb.

The three-light bulb is rapidly coming into use because of its flexibility and convenience. These bulbs require a special base because of two separate filaments in a single bulb. Each filament is of separate wattage and one or both may be used at one time. The bases of the new 50-100-150 and the 30-70-100 watt bulbs are the same size as those of ordinary lamp bulbs. The 100-200-300 watt size has a mogul base and requires a larger socket. The sockets used with these lamps may have either two or three-position switches.

The silvered bowl bulb is commonly used to provide indirect lighting. The metallic finish serves as a reflector to direct the light upward, the bulb being used with bowl end down.

Daylight bulbs are made of a special blue glass which absorbs the red and yellow rays from the filament and supply a light more nearly like daylight. Excellent for use in kitchen, laundry and sewing rooms. The blue glass absorbs about 35% of the light, consequently it is necessary to increase the wattage where this type of light replaces that of the ordinary frosted bulb.



Life of Bulbs - All bulbs have an approximate lifetime, depending upon the use for which they are designed. The average life of general household bulbs ranges from 750 - 1000 hours.

A lamp darkens as it is burned because the filament gradually evaporates and forms a black deposit inside the bulb. This decreases the light output, consequently there is little economy in continuing to use them.

### Fluorescent Bulbs

Sizes - In this type of lamp or bulb, the power is proportional to the length. The sizes most commonly used in the home are the 14-watt, 15 inch bulb; 15-watt, 18 inch bulb; the 20-watt, 24 inch bulb; and the 30-watt, 36 inch bulb.

Colors - These bulbs are made in 3500 and 4500 white, 6500 daylight, soft white, red, gold, pink, blue and green. The 3500\* white, soft white and daylight are in common use now in the home and it is anticipated that the 4500 white and some of the other colors will be used in the home in the future.

Special bases are required - They have a special two-pin base that locks into a holder or socket.

Auxiliaries consisting of a current limiting device called a "ballast" and a starter switch are required for the operation of fluorescent lamps. These are usually placed in part of the fixture itself. The ballast, because it is heavy, is usually put in the base of portable lamps. Ballasts vary in size and weight according to the size and number of tubes used.

Life - The most commonly used fluorescent tubes are rated at a life of 2500 hours.

Efficiency - Fluorescent tubes are more efficient than incandescent bulbs giving two to three times as much and often even more light (depending on the color) for the same wattage or power.

Glare - Fluorescent tubes are "lower in brightness" than incandescent bulbs of the same wattage, making them less glaring when viewed either directly or when reflected from shiny surfaces such as polished desks or tables.

Little heat is radiated from the fluorescent tubes. They are barely warm to the touch.

Cost of tubes - The cost ranges from 57¢ for the 15-watt tube to \$2.15 for the 100-watt tube.

\* 3500 degrees Kelvin - 3500° K.



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